PCT/AU03/01435

PRIORITY DOCUMENT
SUBMITTED OR TRANSMITTED IN COMPLIANCE WITH RULE 17.1(a) OR (b)

Patent Office
Canberra

RECEIVED
28 JAN 2004
WIPO PCT

I, JANENE PEISKER, TEAM LEADER EXAMINATION SUPPORT AND SALES hereby certify that annexed is a true copy of the Provisional specification in connection with Application No. 2003902114 for a patent by SOIL SUB TECHNOLOGIES PTY LTD as filed on 02 May 2003.

WITNESS my hand this
Twelfth day of November 2003

JANENE PEISKER
TEAM LEADER EXAMINATION
SUPPORT AND SALES

AUSTRALIA

Patents Act 1990

PROVISIONAL SPECIFICATION

Name of Applicant	Soil Sub Technologies Pty Ltd
Address for Service:	CULLEN & CO Patent & Trade Mark Attorneys, 239 George Street Brisbane Qld 4000 Australia
Invention Title:	Process for the Treatment of Palm Waste

This invention is described in the following statement:

The present invention relates to a process for the treatment of palm waste.

Date palms are a commodity crop in many countries and in particular throughout east Asia. The cropping of date palms results in a considerable amount of biomass and waste. The biomass and waste is produced in a number of forms, the most significant being fronds of the palm from regular pruning, as well as empty bunches. The majority of biomass and waste produced by the cropping of date palms has not been dealt with in a satisfactory manner. For example, one of the favoured method of disposing of the fronds has been by burning. The burning of the fronds has resulted in much pollution and is considered unsatisfactory.

Other processes for the disposal of the fronds include the simple deposition in regions surrounding the crop where the biomass or waste is allowed to decay or break down over an extended period. Generally this approach is unsatisfactory as the biomass and waste tends to accumulate at a rate greater than that at which it decays.

We have now found a process for addressing at least one of the disadvantages referred to above or at least providing the consumer with a useful or commercial choice. According to the present invention there is provided a process for treating oil palm waste comprising the steps of:

a) shredding date palm fibrous waste;

b) blending the shredded date palm fibrous waste with a plant dried mill effluent and peat.

The process of the present invention may be used to produce a variety of different types of soil medium. In a particularly advantageous aspect the process of the present invention may be used to produce a number of different types of soil medium in proportions selected to consume the entire waste from an oil palm crop.

Soil types that may be produced in the process of the present invention range from high quality growing mediums to mulches and casing soil compositions. The growth mediums produced by the process of the present invention may be used in a wide range of applications including

potting mixes, soil additive, mulch, mushroom casing soil and also as a top dressing material for germination of grass seeds.

Fibrous date palm waste typically includes palm fronds. Empty bunches that have been stripped of fruit are also fibrous waste produced from the processing of oil palms. The fibre and shell from the fruit mass stripped from the empty bunches may be used as oil palm fibrous waste in the process of the present invention.

Date palms have a commercial crop life of more than 20 years. After this period the date palm trees are removed and the next crop is planted. Date palm trunks are produced in an amount of about 75 tonnes per hectare. In the present invention the date palm trunks may be shredded. Typically the date palm trunks will be shredded separately from other fibrous date palm waste.

Palm fronds are obtained regularly throughout the life of a date palm as part of regular pruning. Generally approximately 100kg of fronds are pruned from each oil palm per year whilst from odour oil palms the number of fronds obtained may be up to 150kg. Palm fronds are also obtained from felled palms. Approximately 12 tonnes of pruned fronds are produced per hectare per annum.

The fronds may be shredded by any convenient means. We have found that it is particularly convenient to feed the pruned fronds into a horizontally mounted shredder of the type that sprays the shredded material into a bin or pile for later collection.

It is preferred that the shredded material from the fronds of the oil palms have an average size in the range of from 2mm to 10mm. It will be appreciated that in order to increase the amount of larger shredded fibrous material such as is produced from the trunks of the oil palms, the average size of the shredded fronds may be increased. Dependent upon the type of soil mix being produced the size of the shredded material may be selected. For example in producing a high grade soil or growth medium, it may be preferred to have the shredded material at the lower end of the preferred size range, whilst in producing a mulch it may be preferred to have the shredded

material at the higher end of the preferred size range.

Other fibrous date palm material such as date palm trunks may be shredded in situ. At the end of their crop life, the fronds may be removed and a shredder disposed on an arm may shed the trunk from the top down. The shredded trunk material may be deposited on the ground for later collection or collected continuously in the shredder. In an alternative embodiment, the trunks may be cut down and fed into a horizontal shredder. Trunks that are cut down may be pulverised prior to shredding so as to improve the efficiency of the shredding process. The trunks may be pulverised using clasping jaws or grapples that are operated hydraulically on forestry machinery.

It is preferred that the shredded material from the trunks of the date palms have an average size in the range of from 10mm to 50mm. Dependent upon the type of soil mix being produced the size of the shredded material may be selected. For example in producing a high grade soil or growth medium, it may be preferred to have the shredded material at the lower end of the preferred size range, whilst in producing a mulch it may be preferred to have the shredded material at the higher end of the preferred size range.

Empty bunches may be shredded by any convenient means. We have found that it is particularly convenient to feed the empty bunches into a horizontally mounted shredder of the type that sprays the shredded material into a bin or pile for later collection. Alternatively the empty bunches may be processed in a grinder or hammer mill.

It is preferred that the shredded material from the empty bunches of the date palms have an average size in the range of from 2mm to 10mm. Dependent upon the type of soil mix being produced the size of the shredded material may be selected. For example in producing a high grade soil or growth medium, it may be preferred to have the shredded material at the lower end of the preferred size range, whilst in producing a mulch it may be preferred to have the shredded material at the higher end of the preferred size range.

The shredded date palm fibrous material may be supplemented with additional fibrous material. Additional fibrous material may include fibrous materials derived from fruit bunches harvested from the oil palms. After the fruit mass is stripped from the bunches empty fruit bunches remain. The empty bunches may be used in the process of the present invention. The empty bunches may be shredded by any convenient means. It is preferred that the shredded material from the empty bunches of the oil palms have an average size in the range of from 2mm to 10mm. Dependent upon the type of soil mix being produced the size of the shredded material may be selected. For example in producing a high grade soil or growth medium, it may be preferred to have the shredded material at the lower end of the preferred size range, whilst in producing a mulch it may be preferred to have the shredded material at the higher end of the preferred size range.

Other additional fibrous material may include coconut fibre derived from coconut husks.

The dried plant mill effluent may be derived from any convenient source. For example the dried plant mill effluent may be derived from sugar cane and be in the form of dried mill mud. The term "sugar cane mill mud" in the present specification and claims refers to washing material from sugar cane mills. The washings include cane washings, lime, cane juice impurities and fine bagasse.

Typically, sugar cane mill mud has the following composition:

TABLE 1 – SUGAR CANE MILL MUD

Nutrient/Test	Analytical Range
Moisture Level %	67.9 – 75.5
Water holding capacity %	46.9 – 62.3
pH	5.8 – 6.4
Electrical conductivity	0.54 – 0.77
Total Nitrogen % dm	0.52 – 0.83
Ammonium Nitrogen ppm	5 – 45

Nutrient/Test	Analytical Range
Phosphorus % dm	0.45 – 0.69
Potassium % dm	0.69 – 0.89
Calcium % dm	1.01 – 1.53
Magnesium % dm	0.37 – 0.43
Sulfur % dm	0.13 – 0.19

The dried plant mill effluent may also be dried effluent from an oil palm processing plant or a date palm processing plant. For example, the fruit mass stripped from the fruit bunches of an oil palm may be combined with water. For every 13.2 tonnes of fruit (the approximately amount produced per hectare per annum) 5.6 tonnes of water is used. The processing of the fruit mass yields about 14.4 tonnes of oil and sludge.

About 2 tonnes of nut is yielded from the processing of the fruit mass. The nut is typically combined with about 1 tonne of water for processing. This processing yields about 1 tonne of oil (the economic product produced by the oil palm crop), about 1 tonne of shell and about 1 tonne of nut washings. The washings form part of the effluent.

The about 14.4 tonnes of oil and sludge yielded from the fruit mass is process to produce about a further 4.4 tonnes of oil and the process also yields about 10 tonnes of sludge. The sludge is combined with the sterilizer condensate and the nut washings to give about 13.4 tonnes of effluent. The effluent may be dried by any convenient means. The effluent may be conveniently dried in a mixer where the effluent is stirred or turned during the drying process. Suitable mixers include rotating bowl mixers of the type used in mixing cement. The effluent may also be dried in a pan type drier that relies solely on evaporation for drying. It is particularly preferred that the effluent be subjected to heating during the drying process to increase the drying rate and the extent of the drying of the effluent.

The effluent may be separated into mill mud and washings prior to drying. The mill mud may be dried separately to the washings and similar process to those described above may be used to dry either or both of the mill

mud and the washings.

The mill effluent is preferably dried at a temperature in the range of from 80°C to 200°C.

The dried effluent and the shredded date palm fibrous material are blended with peat.

The peat may preferably be "non-sphagnum" peat. Non-sphagnum peat includes any peat material that is not derived from sphagnum moss. Such heat material includes peat derived from sedges or trees, another suitable peat is cocoa peat derived from coconut fibre. Typically cocoa peat consists of shredded coconut coir (the fibrous part of the coconut shell). The coconut fibre may be either partially composted or used in its raw state. Other types of peat such as Indonesian peat and Malaysian peat may also be used in the process of the present invention. Combinations of any two or more types of peat and or coconut fibre may also be used.

The blending may be in any convenient mixer. Suitable mixers include rotating bowl mixers of the type used in mixing cement. Other mixers may be used from basic mixing arrangements such as a front end loader turning the materials using it's scoop to sophisticated blending equipment.

The dried effluent and the shredded fibrous material may be blended with peat in presence of a wetting agent. We have found that the use of a wetting agent is particularly advantageous in the production of a soil medium as the wetting agent allows the mixed soil medium to pick up and retain a desired amount of water. Suitable the blended soil medium may comprise: 1 tonne of the blend of dried effluent, shredded fibrous material and peat; 1 litre of wetting agent and 10 litres of water. The preferred wetting agent is Safeclean supplied by J T Distributors of Carole Park, Queensland, Australia.

Dependent upon the type of soil medium to be produced using the process of the present invention the proportions of the respective components may be adjusted. The ratio of peat to dried effluent generally applies to the production of all types of soil medium. The volume ratio of peat:dried effluent is generally in the range of from 50:50 to 75:25, preferably

in the range of from 60:40 to 70:30. In the production of a high quality growing medium shredded fibre may be present in an amount in the range of from 10% to 20% by volume, preferably in the range of from 15% to 20%. In the production of a mulching medium shredded fibre may be present in amounts up to about 80% by volume. It will be appreciated that a variety of mediums for different applications may be produced between the growing medium and the mulching medium.

Optional additives may also be blended with the shredded fibre, dried effluent and peat. Such additives include wetting agents, fungicides, nematicides, insecticides and texture and pH controlling agents. Such additives are known to those skilled in the art. The composition may also be supplemented with nutrients, if desired, although it is preferred to balance the nutrients by the use of the shredded fibre, dried effluent and peat in selected amounts.

Where the medium is to be used as a plant growth medium such as potting mix or top dressing soil, it may be desirable to add a filler material to modify porosity and/or water retention. The amount of filler can be varied, depending upon the desired properties of the mix. This can depend on the type of plant to be grown. Suitably, about 30 to about 80 wt % of filler may be added. Potting mixes will typically include about 60 to about 70 wt % filler where top dressing soils can contain lower levels of filler.

A preferred filler is an inert material.

In order that the invention may be more fully understood and put into practice, preferred embodiments thereof will now be described with reference to the following non-limiting examples.

Example

We mixed and compared 3 different growing mediums using palm date waste in one of them to grow vegetables and compare growth rate. The three mediums were;

1. Supersoil™ (growing medium from date palm waste composition described below);
2. Processed clay;

3. Waste from prawn farm ponds.

The Supersoil™ mix consisted of 550kg of Peat, 350kg of oil palm mill mud, and the balance in fibre from shredded date palm fronds. This was mixed slowly in a commercial concrete mixer and during mixing we added 1 litre of concentrated wetting agent in 10 litres of water, this was done to give it a much better water retention. The finished product was placed in a large container adjacent to the other growing mediums and controlled growing tests were carried out.

The Supersoil™ mix obtained double the growth rate of the other mediums. We observed that we also had a far healthier plant free of insects and diseases. We used the same amount of water on all samples of growing mediums during the tests and we had a much better retention rate and therefore we had a better growth rate.

Persons skilled in the art will appreciate that the invention described above may be subject to improvements and modifications that will be apparent without departing from the spirit and scope of the invention described herein.

DATED this 2nd day of May 2003

Soil Sub Technologies Pty Ltd

By Their Patent Attorneys

CULLEN & CO.